CN1085954A

Process for Isolating Glutamic Acid from Concentrated Bacteria-Containing Fermentation Broth

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The process for preparing sodium glutamate contains a step of isolating glutamic acid from a fermentation broth. The fermentation broth is industrially produced by culturing a microorganism and fermenting starch and molasses as the raw material. The advantages of isolating glutamic acid by concentration method over other present methods of isolating glutamic acid lie in that the yield is high, that protein-containing bacteria can be collected, that most of water in the fermentation broth is evaporated, and that it is easy to prepare a fertilizer from the concentrated liquor.

When isolating glutamic acid with conventional concentration methods, the first thing to do is to remove bacterium impurities from the fermentation broth, and then the purified liquor can be concentrated. Conventional processes for removing bacterium impurities include isolation with high speed centrifuge and filtration with inorganic film. However, only factories with relatively good conditions can employ these processes because the electric power consumption of these processes is great and that the operation is complicated.

Patent for an invention CN1048702A discloses a concentration process for isolating glutamic acid. In order to avoid the formation of foam during the concentration of the fermentation broth, a flocculant is also used to remove bacterium impurities at first. However, it is still difficult to filter the flocculate.

The object of this invention is to overcome the disadvantages of the present concentration processes for isolating glutamic acid and to facilitate the processing steps. This invention can also achieve the industrial isolation of glutamic acid with a concentration process.

The object of this invention can be achieved by the following steps: isolating crystals of glutamic acid from a glutamic acid fermentation broth cultured to maturation, isolating glutamic acid from the

fermentation broth at isoelectric point, selecting a proper concentration ratio to concentrate a crystal mother liquor, filtering the concentrated liquor, and isolating glutamic acid from the concentrated liquor at isoelectric point, characterized in that: the bacteria-containing fermentation broth from which glutamic acid is partially isolated is concentrated; the content of glutamic acid in the liquor to be concentrated is adjusted to be in the range of from 1.7 to 2.8 g/100 ml, or the content of glutamic acid in the concentrated liquor is adjusted to be in the range of from 4.5 to 8.5 g/100 ml; the concentrate evaporator is a single-pass flow evaporator; the temperature ranges from 50 to 85℃; the degree of vacuum is 0.06 Mpa to 0.1 Mpa; and an antifoamer is added (not greater than 0.04% of "Paodi" (polyoxyethylene polyoxypropylene glycerol ether), or not greater than 0.04% of methylsilicone oil, or not greater than 0.4% of vegetable oil, any one of the antifoamers).

The single-pass flow evaporator is a three-effect climbing film evaporator (or falling-film evaporator).

This invention has several advantages. First, the single-pass flow evaporator selected is more advantageous to overcome the influence of the formation of foam during concentration compared with other types of concentration equipment. Second, the addition of antifoamer, such as silicon oil and the like, can remove the foam formed during concentration. Third, it is easy to isolate well-crystallized crystals of glutamic acid when the best concentration ratio is selected to adjust the bacteria-containing fermentation broth from which glutamic acid is partially isolated such that the bacteria-containing fermentation broth is concentrated at a proper content of glutamic acid, and the content of glutamic acid in the concentrated liquor is adjusted to a proper concentration.

This invention is an improvement of the patent for an invention CN1048702A, in which the step of removing bacterium impurities is omitted. The processing route of this invention is more practical and can reduce the equipment investment by one fourth.

This invention is further illustrated but not limited by the following

examples.

Example 1

After isolating glutamic acid from a glutamic acid fermentation broth cultured to maturation at isoelectric point, a bacteria-containing fermentation broth in which glutamic acid had been partially isolated was obtained, wherein the content of glutamic acid was 1.5 g/100 ml. A fermentation broth comprising glutamic acid in an amount of 6.5 g/100 ml was added such that the content of the glumatic acid in the liquor to be concentrated reached 2.2 g/100 ml. 20 Tons of said liquor was concentrated. A counter-flow three-effect evaporator was selected. The temperature of the third effect was 50℃, and the degree of vacuum was 0.1 Mpa. The temperature of the second effect was 70℃, and the degree of vacuum is 0.08 Mpa. The temperature of the first effect was 85℃, and the degree of vacuum is 0.06 Mpa. The concentration ratio was 3: 1. Any one of the following antifoamers was added, 0.04% of silicon oil, 0.04% of "Paodi", and 0.4% of vegetable oil. 6.6 Tons of concentrated liquor was obtained and then heated to a temperature of 80℃. 15 Kg of activated carbon was added. A purified liquor was obtained by filtration of a press filter. The purified liquor was cooled and frozen at isoelectric point, pH 3. 350 Kg of glutamic acid was isolated, and the purity thereof was 90%. The content of the glutamic acid in the mother liquor which was crystallized for the second time was 1.8 g/100 ml. This mother liquor was concentrated once again and then was neutralized by ammonia water to be used as a fertilizer.

Example 2

After isolating glutamic acid from a glutamic acid fermentation broth cultured to maturation at isoelectric point, a bacteria-containing fermentation broth in which glutamic acid had been partially isolated was obtained, wherein the content of glutamic acid was 1.5 g/100 ml and pH value was 3. 20 Tons of said liquor was concentrated. A counter-flow three-effect evaporator was selected. The temperature of the third effect was 50℃, and the degree of vacuum is 0.1 Mpa. The temperature of the

second effect was 70℃, and the degree of vacuum is 0.08 Mpa. The temperature of the first effect was 85℃, and the degree of vacuum is 0.06 Mpa. The concentration ratio was 3: 1. 6.6 Tons of concentrated liquor was obtained, in which the content of glutamic acid was 4.5 g/100ml. 150 Kg of glutamic acid was added, and the purity thereof was 90%. The content of glutamic acid in the concentrated liquor reached 6.6 g/100 ml. The concentrated liquor was heated to a temperature of 60℃. A purified liquor was obtained by filtration of a press filter. The purified liquor was cooled and frozen at isoelectric point, pH 3. 350 Kg of glutamic acid was isolated, and the purity thereof was 88%. The content of the glutamic acid in the mother liquor which was crystallized for the second time was 1.8 g/100 ml. This mother liquor was concentrated once again and was neutralized by ammonia water to be used as a fertilizer, and the bacteria-containing filtrate could be used as feedstock.

It can be seen that the technical progress of the process of this invention is obvious over the present processing methods.

What is claimed:

1. A process for isolating glutamic acid from a glutamic acid fermentation broth cultured to maturation, comprising isolating glutamic acid from a fermentation broth at isoelectric point, selecting a proper concentration ratio to concentrate a crystal mother liquor, filtering the concentrated liquor, and isolating glutamic acid from the concentrated liquor at isoelectric point, characterized in that: the bacteria-containing fermentation broth from which glutamic acid is partially isolated is concentrated; the content of glutamic acid in the concentrated liquor is adjusted to be in the range of from 1.7 to 2.8 g/100 ml, or the content of glutamic acid in the concentrated liquor is adjusted to be in the range of from 4.5 to 8.5 g/100 ml; the concentrate evaporator is a single-pass flow evaporator; the temperature ranges from 50 to 85℃; the degree of vacuum is 0.06 Mpa to 0.1 Mpa; and an antifoamer is added (not greater than 0.04% of "Paodi", or not greater than 0.04% of methylsilicone oil, or not greater than 0.4% of vegetable oil, any one of the antifoamers).

2. A process according to claim 1, characterized in that the single-pass flow evaporator is a three-effect climbing film evaporator (or a falling-film evaporator).

Abstract

This process comprises isolating glutamic acid from a fermentation broth at isoelectric point, obtaining crystals of glutamic acid, concentrating the crystal mother liquor, filtering the concentrated liquor, and isolating highly pure glutamic acid directly from the concentrated liquor. The invention is characterized in that: concentrating a bacteria-containing fermentation broth from which glutamic acid is partially isolated, selecting a falling-film thin film evaporator as the equipment for concentration and adding an antifoamer.

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[54]发明名称 浓缩含菌体发酵液提取谷氨酸的方法

[57]摘要

本方法包括发酵液等电点提取谷氨酸，获得谷氨酸结晶，浓缩结晶母液，过滤浓缩液，从浓缩液中直接提取获得纯度高的谷氨酸。本发明在于浓缩含菌体的已经部分提取谷氨酸的发酵液，浓缩设备选用降膜式薄膜蒸发器，投入消泡剂。

权 利 要 求 书

1. 从谷氨酸培养成熟的发酵液中提取谷氨酸的方法，包括发酵液等电点提取谷氨酸，选适合浓缩比，浓缩结晶母液，过滤浓缩液，从浓缩液中等电点提取谷氨酸，其特征在于浓缩含菌体的已经部分提取谷氨酸的发酵液，调整被浓缩液体的谷氨酸含量在 1.7～2.8克／100毫升，或已浓缩的液体，谷氨酸含量调整在4.5～8.5克／100 毫升，浓缩蒸发器是单程式流动蒸发器，温度50℃～85℃，真空度0.06Mpa～0.1Mpa，投入消泡剂，(泡敌不超过0.04%，或甲基硅油不超过0.04%，或植物油不超过0.4%)中的任一种。

2. 根据权力1 要求所述的方法，其特征在于单程式流动蒸发器是三效升膜式蒸发器（或降膜蒸发器)。

说　明　书

浓缩含菌体发酵液提取谷氨酸的方法

在味精生产过程中，有从发酵液提取谷氨酸的步骤，发酵液是工业性生产，由淀粉，糖蜜为原料，经微生物培养发酵制备所得，浓缩法提取谷氨酸与现有各种提取谷氨酸方法相比，优点在于收率高，还可以收集含蛋白质的菌体，发酵液的水份大部分蒸发，最后所得的浓缩液易于处理制作为肥料。

但是历来的浓缩法提取谷氨酸时，首先要把发酵液的菌体杂质去除，获得的清液才进入浓缩，先去除菌体杂质，历来有采用高速离心机分离，无机膜过滤，但是这些方法都由于电能耗量大，和操作复杂，只能局限在条件比较好的企业使用。

发明专利CN1048702A是浓缩法提取谷氨酸，在为了避免浓缩发酵液时产生的泡沫干扰，也是使用絮凝剂，先去除菌体杂质，但是还有絮凝物过滤麻烦的困难。

本发明的目的，在于避免现有浓缩法提取谷氨酸的不足，简化工艺步骤，也能实现工业化生产的浓缩法提取谷氨酸。

本发明的目的可以通过以下步骤来达到，由谷氨酸培养成熟的发酵液中提取谷氨酸结晶，包括发酵液等电点提取谷氨酸，选适合浓缩比，浓缩结晶母液，过滤浓缩液，从浓缩液中等电点提

取谷氨酸，其特征在于浓缩含菌体的已经部分提取谷氨酸的发酵液，调整被浓缩液体的谷氨酸含量在1.7～2.8克／100毫升，或已浓缩的液体，谷氨酸含量调整在4.5～8.5克／100毫升，浓缩蒸发器是单程式流动蒸发器，温度50℃～85℃，真空度0.06Mpa～0.1Mpa，投入消泡剂，（泡敌不超过0.04%，或甲基硅油不超过0.04%，或植物油不超过0.4%）中的任一种。

单程式流动蒸发器是三效升膜式蒸发器（或降膜式蒸发器）。

本发明的优点在于选用的单程式流动蒸发器，比其它类型的浓缩设备更利于克服浓缩过程产生的泡沫的影响，浓缩过程中投入硅油等消泡剂能去除浓缩过程产生的泡沫，当选择最好浓缩比调整已经部分提取谷氨酸的发酵液在适合谷氨酸含量进入浓缩，和调整浓缩完毕的浓缩液的谷氨酸含量于适合浓度，有利于从浓缩液中容易提取得到良好结晶的谷氨酸结晶。

本发明是发明专利CN1048702A的改进，省略了发酵液去除菌体杂质的步骤，体现本发明的工艺路线，比原有未改进的发明专利更合理，设备投资可减少1/4。

通过下面将要叙述的非限定实施例对本发明作进一步详细阐述。

实施例一：

取谷氨酸培养成熟的发酵液，等电点提取谷氨酸后得含菌体

已经部分提取谷氨酸的发酵液，其谷氨酸含量为1.5克／100毫升，投入含谷氨酸量6.5克／100 毫升的发酵液，使被浓缩的液体谷氨酸含量达到2.2克／100毫升，取20吨该液体进入浓缩，选逆流式三效蒸发器，第三效的温度50℃，真空度0.1Mpa，第二效的温度70℃．真空度0.08Mpa，第一效的温度85℃，真空度0.06Mpa，浓缩比3:1．投入消泡剂的任一种（硅油 0.04%，泡敌0.04%，植物油0.4%），得浓缩液6.6 吨．把浓缩液加热至80℃，投入活性炭15公斤，经压滤机过滤得清液，清液经等电点，PH3、降温、冷冻，提取谷氨酸350 公斤，纯度90%，其二次结晶母液谷氨酸含量为1.8克／100毫升，把此母液再浓缩后用氨水中和作肥料。

实施例二：

取谷氨酸培养成熟的发酵液，等电点提取谷氨酸后得含菌体已经部分提取谷氨酸的发酵液，其谷氨酸含量为1.5克／100毫升，PH3.取20吨液体进入浓缩，用逆流式三效蒸发器，第三效的温度50℃.真空度0.1Mpa，第二效的温度70℃，真空度0.08Mpa，第一效的温度85℃，真空度0.06Mpa，浓缩比3:1得浓缩液6.6吨，其谷氨酸量为4.5克／100毫升，投入谷氨酸150 公斤，纯度90%，使被浓滤液体谷氨酸含量达到 6.6克／100 毫升，把浓缩液加热至60℃．经压滤机过滤得清液，清液经等电点降温、冷冻，提取得谷氨酸350公斤，纯度88%，其二次结晶母液谷氨酸含量为1.8克

／100 毫升，把此母液再浓缩后用氨水中和作肥料，含菌体的过滤物可作饲料。

可以看出，本发明方法的显著技术进步，与以前的工艺方法相比是十分明显的。

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